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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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09/880,005

06/14/2001

Hiroaki Inoue

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7590

02/03/2003

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EXAMINER

TRAN, MAI HUONG C

ART UNIT

PAPER NUMBER

2818

DATE MAILED: 02/03/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application N .

09/880,005

Applicant(s)

INOUE ET AL.

Examiner

Mai-Huong Tran

Art Unit

2818

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 14 June 2001.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-23 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-23 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

**Priority under 35 U.S.C. §§ 119 and 120**

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All   b) ☐ Some \*   c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)                      4) ☐ Interview Summary (PTO-413) Paper No(s). \_\_\_\_\_
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)                      5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) \_\_\_\_\_                      6) ☐ Other: \_\_\_\_\_

## **DETAILED ACTION**

### **Claim Rejections - 35 U.S.C. § 103**

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1-4, 7-9, 11-13, and 16-18 are rejected under 35 U.S.C. 103 (a) as being unpatentable over U.S. Patent No. 6,191,530 to Fukuta et al. in view of the remark.

Regarding to claim 1, Fukuta discloses an electroless-plating liquid for selectively forming a plated film 6 on a surface of an exposed interconnect of a semiconductor device having an embedded interconnect structure, electroless-plating liquid comprising cobalt ions (col. 6, lines 37-41).

Fukuta does not disclose the electroless-plating liquid comprising a complexing agent and a reducing agent free from alkali metal.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to form the electroless-plating liquid comprising a complexing agent and a reducing agent free from alkali metal, since it has been held to be within the general

skill of a worker in the art to select a known material on the basis of its suitability for the intended use as a matter of obvious design choice. In re Leshin, 125 USPQ 416.

Regarding to claims 2,7, 11, and 16, Fukuta discloses the claimed invention except for the electroless-plating liquid, wherein reducing agent comprises an alkylamine borane.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to form a reducing agent comprises an alkylamine borane, since it has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended use as a matter of obvious design choice. In re Leshin, 125 USPQ 416.

Regarding to claims 3, 8, 12, and 17, Fukuta discloses the claimed invention except for the electroless-plating liquid, further comprising at least one of a stabilizer selected from one or more kinds of heavy metal compounds and sulfur compounds, and a surfactant.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to form at least one of a stabilizer selected from one or more kinds of heavy metal compounds and sulfur compounds, and a surfactant, since it has been held to be within the general skill of a worker in the art to select a known material on the basis of

its suitability for the intended use as a matter of obvious design choice. In re Leshin, 125 USPQ 416.

Regarding to claims 4, 9, 13, and 18, Fukuta discloses the claimed invention except for the electroless-plating liquid, wherein a pH of electroless-plating liquid is adjusted within the range from 5 to 14 using a pH adjusting agent free from alkali metal.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to form the electroless-plating liquid, wherein a pH of electroless-plating liquid is adjusted within the range from 5 to 14 using a pH adjusting agent free from alkali metal, since it has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended use as a matter of obvious design choice. In re Leshin, 125 USPQ 416.

Claims 5, 6, 15 and 22 are rejected under 35 U.S.C. 103 (a) as being unpatentable over U.S. Patent No. 6,191,530 to Fukuta et al. in view of the remark.

Regarding to claim 5, Fukuta discloses an electroless-plating liquid for selectively forming a plated film 6 on a surface of an exposed interconnect of a semiconductor device having an embedded interconnect structure, electroless-plating liquid comprising cobalt ions, a compound containing a refractory metal (col. 6, lines 37-41, cols. 11 and 12).

Fukuta does not disclose an electroless-plating liquid comprising a complexing agent, and a reducing agent free from alkali metal.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to form an electroless-plating liquid comprising a complexing agent, and a reducing agent free from alkali metal, since it has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended use as a matter of obvious design choice. In re Leshin, 125 USPQ 416.

Regarding to claims 6,15, and 22, Fukuta discloses the claimed invention except for the electroless-plating liquid, wherein refractory metal comprises at least one of tungsten and molybdenum.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to form refractory metal comprises at least one of tungsten and molybdenum, since it has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended use as a matter of obvious design choice. In re Leshin, 125 USPQ 416.

Claim 10 is rejected under 35 U.S.C. 103 (a) as being unpatentable over U.S. Patent No. 6,191,530 to Fukuta et al. in view of the remark.

Fukuta discloses a semiconductor device having an embedded interconnect structure of copper, copper alloy, silver or silver alloy interconnect (col. 4, lines 62-67,

col. 5, lines 1-23), wherein a surface of an exposed interconnect is selectively covered with a protective film 6, protective film being formed by an electroless-plating process with use of an electroless-plating liquid, electroless-plating liquid comprising cobalt ions (col. 6, lines 37-41).

Fukuta does not disclose electroless-plating liquid comprising a complexing agent, and a reducing agent free from alkali metal.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to form electroless-plating liquid comprising a complexing agent, and a reducing agent free from alkali metal, since it has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended use as a matter of obvious design choice. In re Leshin, 125 USPQ 416.

Claim 14 is rejected under 35 U.S.C. 103 (a) as being unpatentable over U.S. Patent No. 6,191,530 to Fukuta et al. in view of the remark.

Fukuta discloses a semiconductor device having an embedded interconnect structure of copper, copper alloy, silver or silver alloy interconnect (col. 4, lines 62-67, col. 5, lines 1-23), wherein a surface of an exposed interconnect is selectively covered with a protective film 6, protective film being formed by an electroless-plating process performed with use of an electroless-plating liquid, electroless-plating liquid comprising cobalt ions (col. 6, lines 37-41).

Fukuta does not disclose electroless-plating liquid comprising a complexing agent, and a reducing agent free from alkali metal.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to form electroless-plating liquid comprising a complexing agent, and a reducing agent free from alkali metal, since it has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended use as a matter of obvious design choice. In re Leshin, 125 USPQ 416.

Claims 19, 20, and 23 are rejected under 35 U.S.C. 103 (a) as being unpatentable over U.S. Patent No. 6,191,530 to Fukuta et al. in view of the remark.

Regarding to claim 19, Fukuta discloses a semiconductor device having an embedded interconnect structure, wherein a surface of an exposed interconnect is selectively covered with a protective film 6 of a metal comprising cobalt (col. 6, lines 37-41).

Regarding to claims 20 and 23, Fukuta discloses the claimed invention except for the semiconductor device, wherein protective film has a thickness within the range from 0.1 to 500 nm.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to form protective film that has a thickness within the range from 0.1



to 500 nm , since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or working ranges involves only routine skill in the art. In re Aller, 105 USPQ 233.

Claim 21 is rejected under 35 U.S.C. 103 (a) as being unpatentable over U.S. Patent No. 6,191,530 to Fukuta et al. in view of the remark.

Fukuta discloses a semiconductor device having an embedded interconnect structure, wherein a surface of an exposed interconnect is selectively covered with a protective film 6 of an alloy comprising cobalt (col. 6, lines 37-41).

Fukuta does not disclose a surface of an exposed interconnect is selectively covered with a protective film of an alloy comprising a refractory metal.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to form a surface of an exposed interconnect is selectively covered with a protective film of an alloy comprising a refractory metal, since it has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended use as a matter of obvious design choice. In re Leshin, 125 USPQ 416.

### **Conclusion**


Any inquiry concerning this communication on earlier communications from the examiner should be directed to Mai-Huong Tran, (703) 305-1958. The examiner can

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normally be reached on Monday-Friday from 8:00 AM to 4:30 PM. The examiner's supervisor, David Nelms can be reached on (703) 308-4910.

The fax phone number for the organization where this application or proceeding is assigned is (703) 308-7724. Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

Mai-Huong Tran



David Nelms  
Supervisory Patent Examiner  
Technology Center 2800